SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

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RAINFALL PERIODICITY.

IT is scarcely right to begin an article with a digression, but the subject upon which we have to write a few words has brought prominently if not painfully before us the muddle which characterizes the length of the calendar months. Of course we do not hope to live to see them adjusted, but if we had a regular system such as either A or B how we should pity the ignorance of those continuing with the set marked C.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
A...	30	31	30	31	30	31	30	31	30	31	30	30 or 31
B...	30	30	30	30	30	30	30	30	30	30	30	35 or 36
C...	31	28 or 29	31	30	31	30	31	31	30	31	30	31

However, we must leave the revision of the calendar to wiser and more powerful heads than ours, and go on with our own subject.

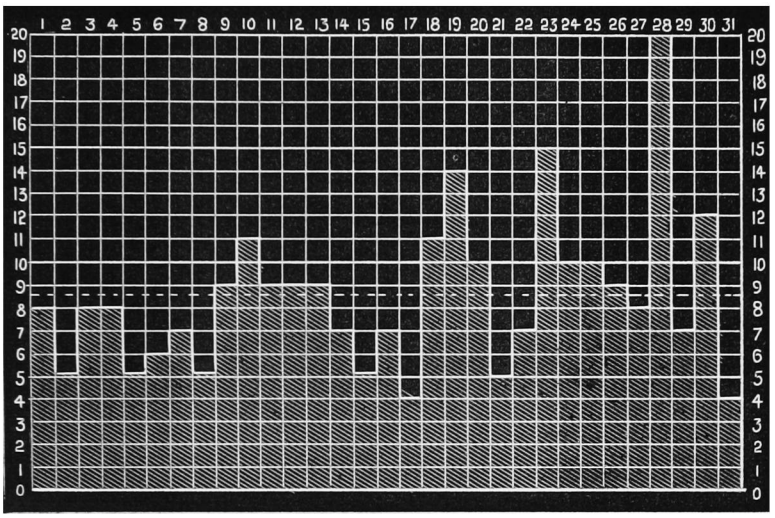
Every year must obviously yield 12 maximum falls, and these divided by the average number of days in a month give 0·39 or say 0·4 as the proportion due to each date. Thus, to take the case quoted by Mr. J. W. Scott, of an eight years register and six dates taken together, we have $0{\cdot}4 \times 8 \times 6 = 19{\cdot}2$ as the number of instances probable within the group of dates 23rd to 28th; at his station for the last eight years, instead of 19 it was 28, an excess of 47 per cent., which appears far too large to be accidental.

Our own register extends over 22 years, and consequently the probable instances for *each* date are $(0{\cdot}39 \times 22)$ 8·58. It seems to us that the very marked excesses shown by this register are worthy of study, and therefore we give the whole of the facts. The table requires no explanation except that in order to economize space the first two figures of each date are suppressed, therefore 1878 appears as 78 and so on. The figures and curve speak for themselves.

It may be only a coincidence, but if so it is a very remarkable one, that Mr. Newnham should specify the 23rd to 28th, that in a register

Date.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	75,79	...	...	...	...	61,65	...	70	...	71	63	67	8
2	...	73	...	...	..	60,67	...	...	...	...	...	63,75	5
3	...	...	64,70	...	69	...	64,77	69,78	77	...	...	...	8
4	73	...	58	.	...	58,68	...	74,76	76	...	62	...	8
5	...	59,60	...	64	...	..	...	...	...	...	73	66	5
6	72	70	60	...	64	...	...	...	...	68	...	61	6
7	...	71	75	...	73,78	...	...	...	70	58	...	74	7
8	77	...	...	75	62,71	...	...	61	...	...	...	...	5
9	...	66	67,73	62,74,77, 79	...	...	...	64	...	...	...	62	9
10	66	79	...	76,78	65,66	...	71	60	...	60	66,75	...	11
11	...	64,69,75	...	...	61,70	77	70	...	67	...	77	...	9
12	63	...	76	...	60	59,62	...	...	...	62,73,76	76	...	9
13	70	58,77,78	...	...	72	64,69	73	...	...	...	61	...	9
14	...	...	63	65	...	...	75	58	73	...	60,71	...	7
15	...	...	71	...	...	76	...	...	...	67	78	70	5
16	...	67	...	...	...	70	62	62	64	...	...	69,72	7
17	...	...	61	...	...	...	...	68,71	78	...	...	...	4
18	68	63	79	71	63	63	...	...	69	66,69,75	...	58	11
19	64,74	62	...	...	77	71	79	67,75,79	58,63	70,79	...	64	14
20	60	76	62,69	67,68,72	59,67	...	...	...	65	...	...	...	10
21	76	...	...	...	...	. .	59,63	...	66	...	79	...	5
22	71	72	...	...	76	...	...	...	...	61,65	68,70	...	7
23	59	61	66,77	60,69	...	74,78	72	65	72,75,79	...	64	76	15
24	...	65	65	...	58	72,79	78	73	60,61	78	...	...	10
25	61	...	68	59	74	...	67	72,77	...	59,72	...	71	10
26	65	74	...	...	...	...	...	59,63	59,68	64	...	59,73	9
27	67	...	...	61	...	...	58,61,74	...	...	77	58,69	...	8
28	69,78	...	72,78	58,66,73	75,79	...	60,66,68, 69,76	66	62	...	59,65,74	77	20
29	...	68	...	70	68	73	...	...	71	74	...	60	7
30	58,62	...	59,74	63	...	66,75	...	...	74	63	67,72	79	12
31	...	...	...	...	..	...	65	...	...	...	...	65,68,78	4

which he had not seen it should prove that the instances of maximum falls have been more numerous on those dates than on any others, that



the collective instances between those dates are more numerous than in any other period of equal length, and that the total number of instances is 71 instead of 52, which would have been the number if heavy falls were of equally frequent occurrence at all dates in the month.

To the Editor of the Meteorological Magazine.

SIR,—My record for 30 years hardly bears out Mr. Scott's theory. You have it on the sheet enclosed, together with all the great falls (which you published two years ago*). Last week's fall was unprecedented (5 inches).—Yours faithfully, W. LUCAS.

Hitchen, Sept. 20th, 1880.

[As the list from 1852 to 1878, both inclusive, was given in the *Meteorological Magazine* for 1878 (Vol. XII., p. 106), we think it needless to print more than the falls since that date.—Ed.]

Falls of 1 *in. and above since August*, 1878 :—

1879.	Jan. 1	.....	1·00 in.	1880.	Sept. 11	.....	1·86
,,	Aug. 2	.....	1·94 in.	,,	,, 14	.....	1·47

Greatest fall in 24 *hours, between* 23*rd and* 28*th inclusive, since* 1849, *as follows* :—

4	times in	1850	.....	5	times in	1861	.....	2	times in	1872
5	,,	51	.....	0	,,	62	.....	3	,,	73
2	,,	52	.....	3	,,	63	.....	4	,,	74
5	,,	53	.....	4	,,	64	.....	3	,,	75
4	,,	54	.....	2	,,	65	.....	2	,,	76
1	,,	55	.....	1	,,	66	.....	3	,,	77
2	,,	56	.....	2	,,	67	.....	6	,,	78
3	,,	57	.....	2	,,	68	.....	3	,,	79
2	,,	58	.....	3	,,	69	.....			
4	,,	59	.....	2	,,	70	.....	—		
3	,,	1860	.....	1	,,	1871	.....	86 times in 30 years.		

* August, 1878.

To the Editor of the Meteorological Magazine.

SIR,—Noticing in two consecutive issues of your magazine letters on the above subject, I am tempted to trespass on your time and space, and send you a few figures relative to the rainfall in this locality.

My record was begun in April, 1870, but in the following table I have only included the nine complete years, 1871–1879.

This is only a short period, but still, as the subject is under discussion, the results for this part of the country may prove of interest to some of your readers.

I think I can guarantee the accuracy of my observations, and I may further state that the record is a complete one, no break having occurred since its commencement in 1870.

	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	Average date of max. fall.
January	7	16	18	16	1	20	3	27	17	14th Jan.
February	5	29	23	21	11	25	25	28	7	19th Feb.
March	15	30	6	28	7	2	24	31	16	18th Mch.
April	22	27	16	13	4	27	4	20	20	17th Apl.
May	25	9	10	5	17	22	10	7	29	15th May
June	22	18	29	30	10	21	21	8	7	18th June
July	29	7	22	23	19	26	14	24	20	20th July
August	24	10	4	27	10	28	20	13	5	16th Aug.
September	27	1	9	30	19	24	2	22	11	16th Sept.
October	6	7	2	6	20	8	12	24	24	12th Oct.
November	14	4	1	28	13	28	30	9	24	17th Nov.
December	30	16	19	6	31	30	30	25	9	22nd Dec.
Number of months in which the max. fall occurred between the 23rd and 28th of the month..	3	1	1	4	None.	6	2	5	2	
Average date of max. fall for each month	19th	15th	13th	19th	14th	22nd	16th	20th	16th	

The above table shews the date of maximum fall in every month of the nine years, the average date for each month, the average date of the month for each year, and the number of months in each year when the maximum fall occurred between the 23rd and the 28th.

I find, from the above table, that our monthly maximum fall occurs, on the average, on the 17th.

I send these few remarks and figures in the hope that they may be of some service, and shall be glad to give any of your correspondents further details, as to the rainfall in this locality, in the event of the subject being more fully and thoroughly worked up.—Yours faithfully,

ARTHUR R. ANDERSSON.

Breeze Hill, near Liverpool, Sept. 23rd, 1880.

To the Editor of the Meteorological Magazine.

SIR,—Your correspondents, Mr. Newnham and Mr. J. W. Scott, seem to be of opinion that the heaviest rainfall in each month usually

occurs towards the end, especially from the 23rd to the 28th inclusive. Now, although such may seem to be the case, judging from the records of a number of years past, I cannot but think that it is an accidental coincidence.

The calendar month is quite an arbitrary division of time, and does not correspond with any astronomical period. It is about 30·44 days on the average, whilst the lunar synodic month consists of 29·53 days, and the revolution of the sun on its axis, relatively to the earth, takes place in 27·3 days; and these seem the only astronomical periods, approaching the calendar month in length, that can possibly affect the weather.

The 25th January last was the fourteenth day of the moon, and the 25th of December will be the twenty-fourth of the moon.

The day of heaviest rainfall varies at different stations, therefore the returns from one or two places do not form a sufficient foundation on which to build a theory.

I may just add that the heaviest falls here, during the past eight years, have occurred twenty-three times, instead of twenty-eight times, on the days referred to.—Yours truly, S. KING.

Elswick Lodge, Sept. 20th, 1880.

[It may be well to extract the essential features from the above letters, so that our readers may understand precisely the evidence on both sides, for it seems to us that even our correspondents hardly realize the force of the evidence they supply. We will throw the facts into a table :—

Div.	Station.	Years discussed.	Instances of **M** between 23rd and 28th.		Instances in excess of probable No.	
			Probable.	Actual.	Number.	Per cent.
I.	Muswell Hill	8	19	28	9	47
I.	Camden Square	22	52	71	19	37
III.	Hitchen	30	71	86	15	21
VIII.	Liverpool	9	21	24	3	14
VIII.	ElswickLodge,Lancashire	8	19	23	4	21

ED.]

REMARKABLE HAILSTONES.

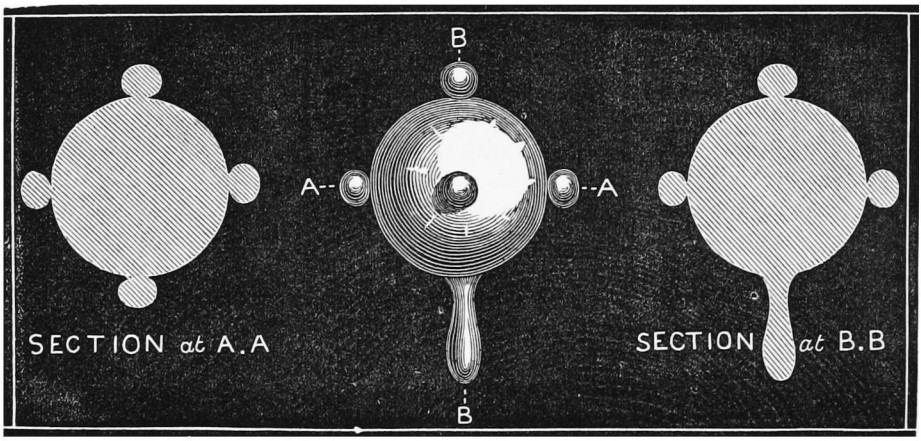
To the Editor of the Meteorological Magazine.

SIR,—During a slight thunderstorm at 6 p.m. on the 21st inst., there fell hailstones of a shape which I have never before seen. The day had been cloudless. I was on a mountain about 3000 feet above the village, and saw the cloud (a small one) pass over the valley below me. There were several peals of thunder but there was no visible lightning, owing, I conclude, to the sun's brightness.

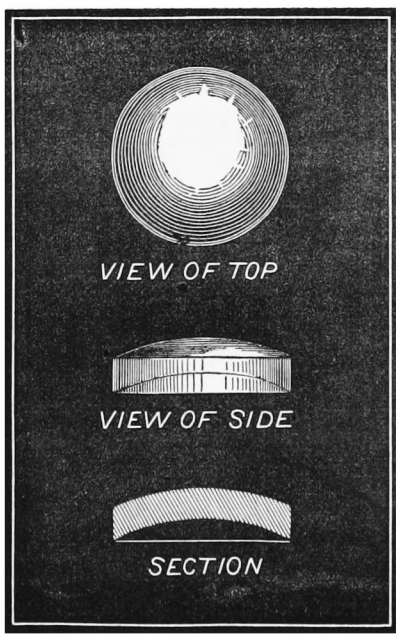
On arriving near home, I met a friend who told me it had been hailing "tadpoles" and "acidulated drops." There had been little or no rain and no visible lightning, and the hailstones fell at in-

tervals and about six feet apart. There were very few of them, my family only picking up 20 in a space occupied by a full-sized lawn tennis court.

My son made a sketch of their shape and size, which I enclose.



The greater part were of the "tadpole" shape and were clear as glass, perfectly round, the five knobs being at equal distance from one another. The flat stones had more or less a slight nucleus of snow in the convex portion of the stone.



Yesterday, in a severe storm in a gorge in the heart of the Zugspitz, a quantity of hail, with torrents of rain, fell. They were small, and apparently round, but, looked at sideways, they were

hexagonal with rays to centre. Several "cones" also fell, looking, from their shape and size, as if they had formed part of one hail-stone.—Truly yours, MICHAEL FOSTER WARD.

Partenkirchen, Bavaria, 27th August, 1880.

[On receipt of this letter we wrote and asked Col. Ward a few questions, to which he kindly replied as follows.—ED.]:—

To the Editor of the Meteorological Magazine.

SIR,—Yours just received, and I lose no time in replying as far as I can to your queries. My son, who made the sketch and carefully examined the stones, is now at Sandhurst, and I have written to him telling him also to write to you.

My wife and three daughters, and two ladies staying with us, say that the stones looked just like a lady's hand looking glass, with a knob at the top and on either side for ornament.

More than 20, perhaps 30, were picked up of this shape. Of these about two-thirds were studded, the rest plain, with only the tail or handle, the thinnest part of it being near the body of the stone, as in sketch.

The studs were all symmetrically placed. I have carefully questioned my wife and girls on this point, and they say that they *remarked particularly* the fact of their *being* so *equi-distant* one from the other.

There were from three to five in each stone besides the handle. When there were less than five they occupied the same positions as if the five had been complete. In some cases the handle appeared to have been knocked off.

The drops were more numerous, were *all* of same shape, convex at the top, the bottom being concave (like a small china painting palette).

I wish I had seen the stones myself—not that there is the slightest doubt of their being as described. They were seen not only by my family and the friends with us, but by other people who were with them that afternoon, and whom I met on my way home, and who described them to me exactly as my family did. They ate a quantity of them, holding them by the handles to do so.

My daughters say that my son examined them most carefully, being so extraordinary in shape and knowing that I was observing for Prof. Colladon, of Geneva, who is studying the subject, and has asked me to watch carefully every hailstone I can, and send him a description of size, shape, and formation. I have not yet heard from the Professor, his time being so much taken up with the St. Gothard tunnel that he has little for aught else.

The cloud from which these curious hailstones fell, though appearing to us on the mountain as quite low down below us, appeared to those in the valley as at a considerable height; so I fancy it was not of very great thickness.—Sincerely yours,

MICHAEL FOSTER WARD,

Villa Fraundorfer, Partenkirchen, 14th Sept. 1880.

My eldest girl has just come in and read this. She says it is strictly accurate, and that *her* first remark on seeing the stones was, "They are just like a clown's head, with his tuft at the top and each side."

To the Editor of the Meteorological Magazine.

SIR,—My father has just written to tell me that you wish for a description of the hailstones found on August 21st.

They were of the shape and size shewn in the sketch, and of those we picked up, more than twenty in number, nearly all had the five studs complete. In some cases one or two were wanting, but in these there was an irregularity in the surface of the larger sphere at the places occupied, in the more complete specimens, by the studs, as if they had been either melted or knocked off.

The studs were all symmetrically placed, a round one being opposite to the longer handle-shaped stud, and the four others arranged at equal distances round the sphere at AA′, which is at right angles to the section BB′. There were thus five apparently spherical balls, and one oblong stud.

With regard to those shaped like acid drops, one side was convex, and the other concave. The curve of the sides was about that of a circle of two inches diameter.

In some instances I remarked that the latter were slightly opaque in the centre, but round the edges clear.—I remain, Sir, yours truly, RAWDON WARD.

Royal Military College, Sandhurst, Hants, Sept. 17th, 1880.

THE BRITISH ASSOCIATION AT SWANSEA.

(Concluded from page 117.*)*

REPORT OF THE COMMITTEE ON UNDERGROUND TEMPERATURE.

This report, prepared and read by Prof. Everett, proceeds on much the same lines as those of the twelve previous years. A fresh series of observations has been started at Lead Mines in North Wales, through the co-operation of Mr. Walker, but the results seem to be rendered irregular by the presence of decomposing iron pyrites. The report gives also data recently obtained from the Astley Pit at Dukinfield, which has now reached the great depth of 2,700 feet.

ON THE TEMPERATURE OF TOWN WATER SUPPLIES.

BY BALDWIN LATHAM, C.E.

This was a sequal to the paper read upon the same subject last year. The author shows conclusively that the temperature of the water when delivered is entirely regulated by that of the soil through which the mains are laid. And as there seems evidence that the supply of drinking water at a high temperature is not so healthful as at a low one, he urges that water mains should be laid at such a depth as to escape great extremes of temperature. The observations of earth temperature which have of late years become general will supply data of importance in this respect.

ON THE LAWS OF CHANGE OF VELOCITY AND DIRECTION OF WIND.

By Prof. D. Ragona.

No abstract of this paper has reached us.

THE SANITARY INSTITUTE.

EXETER CONGRESS.

This young but rising Institute has held a most successful autumn meeting at Exeter; the local authorities equally by their energy and by their liberality not only deserved success but obtained it, and while the Institute ought to be thankful for the handsome hospitality and constant encouragement rendered by the Right Worshipful Mayor (Mr. W. Horton Ellis, F.M.S.,) and by the Lord Bishop, the city may remember with satisfaction that it had for its guests a large proportion of the very highest authorities in the country upon sanitary matters. We cannot afford space to quote many, but may take a few, grouping them under the three sections into which the work of the Congress is divided.

First, however, we must take the President (Earl Fortescue), himself a well-known veteran in sanitary matters, and with his name we may couple those of the Bishop (Dr. Temple), Sir Stafford Northcote, and Mr. H. S. Northcote, M.P.

The section for State Medicine could hardly have a better president than Prof. De Chaumont, the head of the Government establishment at Netley, supported by Dr. Richardson, F.R.S., Mr. Edwin Chadwick, C.B., and Prof. Corfield.

The president of the section for Engineering was Mr. R. Rawlinson, C.B., C.E., chief engineering inspector to the Local Government Board, and he was supported by several members of the Institution of Civil Engineers, who have given much attention to sanitary matters, *e.g.*, Mr. Rogers Field, Mr. R. B. Grantham, Mr. Boulnois, and Major-General Scott, C.B., F.R.S.

The third section, Meteorology and Geology, was presided over by Sir Antonio Brady, F.G.S., one of the Trustees of the Meteorological Society, and among his supporters (besides some already mentioned) were Mr. T. Andrew, F.G.S., Mr. W. Pengelly, F.R.S., F.G.S., Mr. G. J. Symons, F.R.S., Pres. M.S., Mr. E. E. Glyde, F.M.S., &c.

It would be running beyond our tether to quote all the paragraphs touching upon meteorology, and even with Sir Antonio Brady's address we are obliged to deal harshly. It would more than fill the whole of this number of the *Meteorological Magazine*. But the Institute publishes its Transactions at a very low price, and it is intended that the volume shall be ready within a month (what a lesson to the British Association if it is ?) and therefore we leave our readers to obtain it *in extenso*.

We must, however, state briefly that the general scope of the address was a sketch of the physical history of the globe from its

first existence as a cooling nebulous mass, tracing it through varied geological and climatological conditions until man came upon it, and more or less spoilt it—dessicating some countries by ruthless destruction of forests, poisoning rivers with sewage, the air with coal smoke, and in sundry other ways changing the natural condition of things, and "paying the penalty for so doing."

Sir Antonio Brady went at great length into the injurious effects of cutting down forests, and also into the doubts thrown upon the advantage of the millions of money expended upon irrigation works in India. We trust that these parts of his address will be carefully studied, and we are sure that he will join us in hoping that the alarming statements which he quoted from Col. Corbett as to the injury wrought by irrigation works will be entirely refuted.

The following is the only strictly meteorological paper read at the Congress.

SOME DEFICIENCIES IN OUR KNOWLEDGE RESPECTING HEALTH RESORTS.

By G. J. SYMONS, F.R.S., *President of the Meteorological Society.*

THE remarks which I have to offer upon the present occasion differ materially in their character from those which are assumed to usually form the basis of those submitted to scientific bodies.

As a rule, an author reads a paper in order to bring before his audience, and perhaps still more before that far larger audience which he addresses through the press, something which he believes to be new, something which he hopes will make the world wiser and better than it would be without it.

I am aware that there are persons who read papers with the sole desire to see their names in print, and others who do so in order to puff the commodities in which they deal—but they are beneath notice.

Well, then, the usual object of a paper is to afford information. But mine is to obtain it, and although perhaps I shall give a little in the mere explanation of what I want, still I hope that the balance will eventually be largely in my favour, and that is why the title of this paper does not promise any information at all.

It has lately been said, and I think with truth, that whereas in past years the Autumn holiday was a *luxury*, it has, through the increasing exhaustion due to modern high pressure life, become a *necessity*.

Assuming that to be true, it is obviously of increasing importance that the localities to which we temporarily migrate should be as healthy as they can be made.

And here it may be well to remark that the visitors are better judges of what is healthy than the residents. Those who spend the whole twelvemonth on a bracing mountain slope cannot realize that it matters whether the bedroom windows open at the top or not; and, as sleeping in a close room does not affect them, they set any remonstrance down as a whim of their visitors, forgetting that it is the constant breathing of a pure atmosphere during the day and all through the year which enables them to sleep in a used-up atmosphere with impunity—and equally forgetting that it is largely for the sake of pure air that their visitors come, that where they get most pure air they will derive most benefit, and will therefore be most likely to return.

I have quoted only one feature—windows; but need hardly say that identical reasoning applies to cleanliness in every respect—to purity of water, to the quality and cooking of food, and, indeed, to all the ministrations of life.

This digression has taken me far away from the subject I wish to bring before you. I must return abruptly, and try to keep closer to it.

I am far from denying that, in spite of the very unsanitary—and to our

notions, offensive—arrangements existing at many places on the Continent, it is often better for persons to go to a continental health resort than to stop in the United Kingdom, because the change of air, scene, habit, and language, is more thorough. Yet, I believe, it would be far better to bestow more attention on our own health resorts than we do.

(To be continued.)

SUPPLEMENTARY TABLE OF RAINFALL IN SEPT., 1880.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	5·90	XI.	Corwen, Rhug	2·82
,,	Margate, Acol	2·94	,,	Port Madoc	5·30
,,	Littlehampton	5·14	,,	Douglas.....	4·44
,,	St. Leonards	3·91	XII.	Carsphairn	4·61
,,	Hailsham	2·43	,,	Melrose, Abbey Gate...	3·99
,,	I. of W., St. Lawrence.	5·25	XIV.	Glasgow, Queen's Park.	...
,,	Alton, Ashdell.....	6·07	XV.	Islay, Gruinart School..	3·63
III.	Great Missenden.....	5·41	XVI.	Cupar, Kemback.....	3·56
,,	Winslow, Addington ...	4·08	,,	Aberfeldy H.R.S.	1·32
,,	Oxford, Magdalen Col...	3·67	XVII.	Tomintoul.....	...
,,	Northampton	4·65	,,	Keith H.R.S.	1·72
,,	Cambridge, Merton Vil.	2·85	,,	Forres H.R.S.	1·21
IV.	Harlow, Sheering	4·54	XVIII.	Strome Ferry H.R.S....	4·42
,,	Diss	2·58	,,	Auchnasheen H.R.S. ...	...
,,	Swaffham	3·86	,,	Lochbroom	2·12
,,	Hindringham	3·35	,,	Tain, Springfield.....	1·86
V.	Salisbury, Alderbury...	3·57	,,	Loch Shiel, Glenfinnan.	7·95
,,	Calne, Compton Bassett	4·05	,,	Dalwhinnie H.R.S.....	...
,,	Beaminster Vicarage ...	5·91	XIX.	Lairg H.R.S.	...
,,	Dartmoor, Princetown..	...	,,	Altnabreac H.R.S.	3·06
,,	Langtree Wick	3·63	,,	Watten H.R.S.	3·63
,,	Lynmouth, Glenthorne.	2·40	XX.	Fermoy, Glenville	2·61
,,	St. Austell, Cosgarne...	3·80	,,	Tralee, Castlemorris ...	2·61
,,	Taunton	3·00	,,	Cahir, Tubrid	2·30
VI.	Bristol, Ashleydown ...	3·93	,,	Tipperary, Henry St....	2·84
,,	Ross	3·62	,,	Newcastle West	...
,,	Wem, Sansaw Hall.....	1·75	,,	Kilrush	2·98
,,	Cheadle, The Heath Ho.	3·41	,,	Corofin	3·34
,,	Bickenhill Vicarage ..	5·54	XXI.	Kilkenny, Butler House	...
VII.	Melton, Coston	4·50	,,	Carlow, Browne's Hill..	2·79
,,	Horncastle, Bucknall ...	3·78	,,	Kilsallaghan.....	2·26
VIII.	Walton-on-the-Hill.....	3·01	,,	Navan, Balrath	1·98
,,	Broughton-in-Furness ..	5·33	,,	Athlone, Twyford	2·66
IX.	Wakefield, Stanley Vic.	4·72	,,	Mullingar, Belvedere ...	2·60
,,	Ripon, Mickley	4·40	XXII.	Ballinasloe	2·17
,,	Scarborough.....	3·50	,,	Clifden, Kylemore	5·02
X.	Mickleton.....	4·06	,,	Crossmolina, Enniscoe..	3·49
,,	Haltwhistle, Unthank..	4·98	,,	Carrick-on-Shannon ...	2·72
,,	Shap, Copy Hill	4·57	XXIII.	Dowra	2·89
XI.	Llanfrechfa Grange	4·06	,,	Rockcorry.....	3·03
,,	Llandovery	3·03	,,	Warrenpoint	4·21
,,	Solva.....	2·01	,,	Newtownards	3·07
,,	Castle Malgwyn	4·56	,,	Carnlough.....	3·27
,,	Rhayader, Nantgwillt..	4·92	,,	Bushmills	3·29
,,	Carno, Tybritle	2·90	,,	Buncrana	3·14

THE WEATHER IN SEPTEMBER.

Real "summer weather" prevailed over Great Britain during the first week; but in Ireland and western Scotland it was rather less settled than elsewhere, and there were a few slight showers. Lightning was seen in many places during the latter part of the week, thunder accompanying it in some cases.

Barometric pressure varied considerably, owing to the advance of several depressions from the Atlantic, namely, on the 2nd, 3rd, and two during the night 5th–6th—one to the N.W. of Scotland, the other accross the Bay of Biscay, towards our S.W. coasts. When the last of these had passed away, the bar. rose over the whole of our islands, and gradients for W. and N.W. breezes became general.

Temp. was above the average throughout our islands. In S. and S.W. England the excess was 4°, but in nearly all other parts as much as 6° or 7°. The highest temperature of the present year was recorded, namely, 88° at Nottingham and Cambridge, 87° at Loughborough and in London, all on the 4th. The nights were generally mild; but during those of the 1st and 6th a min. of between 43° and 47° was registered in the inland districts.

Rainfall below the mean. in all parts, the deficit being as great as 0·95 in. at Barnstaple. The smallest deficit was 0·01 in. at Cambridge.

Bright sunshine, except in S. Ireland, shewed a decided increase. Max. duration 64 hours at York, and 60 hours at Geldeston (Norfolk); min. duration, 28 hours at Valentia.

During the 7th and following night the bar. rose very briskly in N. Ireland, in Scotland, and in the W. of Norway, an anticyclone being formed over the N. of our islands. In France, and in the S.W. and S. of these Isles, however, pressure decreased somewhat, owing to the arrival of a depression over the Bay of Biscay. The charts of the next morning shewed that this had moved N. wards till it was over the Scilly Islands, while the anticyclone in the N. had widened out till it occupied the E. coast of Great Britain as far S. as Shields, S. and S.W. Norway, a large part of Denmark, and the sea intervening. The bar. consequently fell in the W. and N.W., but rose quickly over Scandinavia. Both the fall and the rise continued during the next 24 hours, so that readings, on the morning of 10th, varied from 30·2 in. over Sweden to 29·4 in. off our extreme N.W. coast, near to which latter district a large area of low pressure was moving N.E. ward. A small secondary disturbance moved across Ireland on the afternoon of the 10th, and was over Devon, Dorset, and Gloucestershire on the following morning. Both this secondary, and the large disturbance, disappeared during the 11th; but a third came across the W. of France during the latter part of the 11th, and at 8 a.m. on the 12th was shewn off the English E. coast, the weather being very unsettled. A brisk decrease of pressure began in the W. on the evening of the 13th, and the charts of the 14th shewed that a small but deep depression had arrived in the neighbourhood of Valentia, where the bar. fell 0·80 in. in 24 hours.

Temp. rather above the mean, except in E. and central England, and N. Ireland, where it was about the average. The max. took place on the 10th, 80° in London, and 79° at Nottingham being the highest. The min. were rather low, the ther. falling to 37° at Shrewsbury, and 38° at Churchstoke and Markree Castle. At Silloth the ther. on the grass fell to 30° on the early morning of the 8th.

Rainfall above the average, except in W. Scotland. The excess was as much as 1·87 inch at Strathfield Turgiss, 1·77 at Loughborough, and 1·71 at Rothamsted. At Glasgow and Ardrossan the deficit from the mean was nearly half-an-inch.

Bright sunshine decreased, except in Ireland. Max. duration: 54 hours at Geldeston, 51 hours at Douglas. Min. duration: 24 hours at Falmouth, 27 hours at Cirencester.

The depression noticed as near Valentia on the morning of the 14th, travelled

during the day in a S.E. direction to Cornwall: during the night (14th–15th), however, it changed its course, and moving E.N.E. was at 8 a.m. on the 15th near Lowestoft. After moving irregularly during the 14th, it travelled north-eastwards to Denmark during the 16th and night following; but a new and larger depression appeared off the N.W. of Scotland, producing a decrease of pressure over Scotland and Ireland. This area of low pressure came to a halt on its arrival off the Scotch coast, while subsidiary disturbances passed across the more southern districts, keeping the weather very unsettled. All these disappeared E. wards during the 19th, causing a fall of the bar. over the whole of the countries to the E. of the North Sea; in these islands and the W. of France pressure increased briskly, and the area of high readings which, on the 19th, lay over the S. of France, spread northwards towards the S.W. coasts of these Islands. During the next 24 hours the bar. rose slightly over England and France; but fell in the far N.; the distribution of pressure remaining, however, much the same.

Temp. a few degrees less than the average in all parts. The max. were all very low, 69° at Loughborough on the 16th, being the highest. The min. were generally 39° and 40°. A frost on the grass occurred in London early on the 20th; but the min. in the shade did not fall below 41°.

Rainfall above the mean everywhere, except at Nairn, the excess being considerable over the greater portion of England and in W. Scotland. Heaviest falls: 3·44 inches at Rothamsted, 3·22 at Southampton, 3·11 at Kelstern, 3·02 at Douglas, and 3 inches at Leicester. Lightest fall: 0·23 at Nairn.

Bright sunshine prevailed during less hours than in the week preceding. Max. duration: 43 hours at Douglas; min. duration: 18 hours at Llandudno.

The weather during the week, 21st–27th, was dry in all districts: the sky was, however, very cloudy or overcast, and on some days there was fog or haze.

Under "barometer" there is little to remark. Pressure continued to be highest in the S., and lowest in the N.; but the passage across our islands of several subsidiary disturbances, during the 21st and day following, made the gradients for S.W. and W. irregular, and the wind rather variable. During the 25th, pressure increased everywhere, except on our extreme N.W. coasts, and a large area of comparatively high readings covered France, all the more southern parts of our islands, the larger portion of the North Sea, and Scandinavia. Next day pressure increased over all W. Europe; but a depression, which was shewn off the N.W. coast of Norway on the charts of the 27th, moving E. wards during the day, produced a fall of the bar. over Scandinavia, while it rose in our Isles and France, so that the area of high pressure now occupied the whole of these islands, N. Germany, and N. France.

Temp. slightly more than the mean. The max. took place mostly on 27th, when a reading of 75° in London was recorded. The absolute min. was only 39° (at Glenalmond, on 21st and 22nd).

Rainfall a good deal below the average, except at Durham and Silloth. Heaviest falls, 0·99 in. at Laudale and Silloth; lightest falls, 0·01 in. at Cirencester.

Bright sunshine was everywhere of very short duration. Max. duration, 27 hours, at Aberdeen; min. duration, 6 hours, at Cirencester.

The depression, which was over Scandinavia on the 27th, moved off on the next day, and pressure increased somewhat there; but during the 29th a new disturbance advanced to the N. of Scandinavia, occasioning a rapid fall of the bar.. over Scandinavia. Over these islands, and the N. of France, the anti-cyclone maintained its position. The depression disappeared during the 30th, and the bar. rose over Norway and Sweden; but in these islands and France pressure decreased, the anticyclone hence being shifted a little more to the south-east.

Lowestoft. H. E. M.

SEPTEMBER, 1880.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date.	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	Camden Square	4·04	+ 1·78	1·33	11	12	88·3	4	42·1	20	0	0
II.		Maidstone (Hunton Court)	3·07	+ ·95	.95	14	13	...	...	...	...	...	...
,,		Strathfield Turgiss	4·57	...	1·58	11	14	85·0	4	41·4	20	0	0
III.		Hitchen	5·06	+ 3·20	1·86	11	14	77·0	4	42·0	18	0	...
,,		Banbury	5·08	+ 2·71	1·52	12	18	82·5	4	43·0	19	0	...
IV.		Bury St. Edmunds (Culford)	4·52	+ 2·91	1·75	11	12	82·0	4	41·0	7*	0	...
,,		Norwich (Cossey)	2·24	+ ·45	·75	14	13	85·0	4	43·5	8,19	0	...
V.		Bridport	4·05	+ 1·73	1·10	13	13	...	...	...	...	...	...
,,		Barnstaple	4·07	+ ·31	·98	15	15	...	...	...	...	...	...
,,		Bodmin	4·18	+ ·51	·76	18	19	76·0	4	47·0	7	0	0
VI.		Cirencester	4·29	+ 1·43	·86	13	12	...	...	...	...	...	...
,,		Shifnal (Haughton Hall)	3·53	+ 1·58	·90	15	18	80·0	4	40·0	19	0	0
,,		Tenbury (Orleton)	3·45	+ ·77	·88	14	15	84·8	4	38·3	20	0	0
VII.		Leicester (Town Museum)	5·28	...	1·39	14	18	84·4	4	43·0	8	0	0
,,		Boston	4·91	+ 3·34	1·58	15	12	88·0	4	43·0	19	0	...
,,		Grimsby (Killingholme)	4·86	...	1·73	11	13	77·0	3	43·0	20	0	...
,,		Mansfield	4·64	...	1·19	15	13	75·5	4	41·8	8	0	0
VIII.		Manchester (Ardwick)	...	...	...	...	...	...	...	...	...	...	...
IX.		York	4·57	+ 2·24	1·32	11	14	89·0	4	43·0	20	0	1
,,		Skipton (Arncliffe)	6·25	+ 1·29	1·06	15	20	79·0	3,4	40·0	19	0	...
X.		North Shields	4·34	+ 2·64	1·02	14	17	72·2	4	40·0	20	0	0
,,		Borrowdale (Seathwaite)	9·51	— 3·70	1·21	10	19	...	...	...	...	..	...
XI.	WALES.	Cardiff	3·67	...	·77	17	15	81·6	4	44·8	20	0	0
,,		Haverfordwest	3·83	+ ·12	·63	14	16	78·0	4	43·0	28	0	...
,,		Aberdovey	1·26	...	·21	12	14	...	...	...	...	...	...
,,		Llandudno	2·16	— ·18	·40	22	16	81·8	4	47·0	19	0	...
XII.	SCOTLAND.	Cargen	3·24	— ·22	·78	10	16	80·4	4	40·2	20	0	...
,,		Hawick (Silverbut Hall)	4·24	...	1·63	14	15	...	...	...	...	...	...
XIV.		Douglas Castle (Newmains)	4·02	...	·88	14	17	...	...	...	...	...	...
XVI.		Loch Long (Arddaroch)	...	...	...	...	...	...	...	...	...	...	...
,,		Kilmory	3·72	...	·79	10	18	...	...	35·0	20	0	...
,,		Mull (Quinish)	5·26	...	1·50	10	19	..	...	...	...	...	...
,,		Loch Leven	2·70	— ·33	1·00	16	...	...	...	...	...	...	...
XVII.		Arbroath	3·34	+ ·82	1·09	14	11	74·0	3	41·0	20†	0	...
,,		Braemar	2·69	+ ·05	·83	10	16	74·3	4	32·3	19	0	5
XVIII		Aberdeen	3·27	...	·86	10	14	77·0	3,5	37·0	18	0	...
,,		Portree	5·22	— 5·54	·65	10	22	...	...	...	...	...	...
,,		Inverness (Culloden)	1·46	— 1·23	·28	24	...	77·1	4	37·9	19	0	1
XIX.		Dunrobin	...	...	...	...	...	...	...	...	...	..	...
,,		Sandwick	4·16	+ ·50	·86	30	21	70·0	4	45·3	19‡	0	0
XX.	IRELAND.	Cork (Blackrock)	1·96	...	1·05	13	17	82·0	2	41·0	12	0	...
,,		Darrynane Abbey	...	...	...	...	...	...	...	...	...	...	...
,,		Waterford	2·94	— ·19	1·33	13	15	74·0	4	39·0	20	0	0
,,		Killaloe	2·95	— 1·21	·69	17	19	85·0	2	40·0	20	0	...
XXI.		Portarlington	2·31	— ·97	·45	17	22	79·0	4	42·0	12	0	...
,,		Monkstown	2·90	+ ·91	·74	14	15	..	...	...	...	...	...
XXII.		Galway	2·67	...	·53	20	15	75·0	5	40·0	19	0	...
XXIII		Waringstown	3·46	...	·99	17	15	77·0	3	41·0	18	0	...
,,		Londonderry	2·53	...	·56	21	19	78·0	4	45·0	8§	0	0
,,		Edenfel (Omagh)	2·99	...	·49	17	20	79·0	4	34·0	7	0	...

* And 16, 20. † And 21. ‡ And 20, 24. § And 19, 28.

\+ Shows that the fall was above the average; — that it was below it.

METEOROLOGICAL NOTES ON SEPTEMBER.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—Rainfall of the month 1·57 in. above the average of the last 14 years. Last week of month fine, warm, and genial; at intervals like a St. Martin's summer. Root crops excellent.

HITCHEN.—Mean temp. very high. From 11th to 17th inclusive the largest amount of rainfall recorded in one week during the last 30 years.

BANBURY.—White corn almost all harvested by end of month.

CULFORD.—The dry weather of August continued for a few days of this month, and vegetation began to show signs of distress, but on the 5th the bar. began to fall, and there was slight rain next day; on the evening of the 10th a severe tempest occurred, lasting four hours; the L was very intense, and 1·75in. of rain fell in six hours. The month ended with fine and enjoyable weather.

COSSEY.—Harvest was generally over in this district before the rain set in on the 11th, after a rainless period of 15 days. TS on 11th, and T on 18th and 19th.

BODMIN.—Mean temperature of the month 60°·1.

CIRENCESTER.—Much heavy rain in the middle of the month. Wind principally S.W.

SHIFNAL.—Rain fell daily in considerable quantities from the 9th to the 24th. The max. temp., 80° on the 4th, was the highest recorded during the year, but the temp. soon returned to its former moderate condition. After the 23rd fogs or mists occurred most mornings, often turning into bright sunshine, but there was no wind to dry the grain still unstacked. T on 14th.

ORLETON.—A remarkably fine month, with a mean temp. more than 2°·5 above the average. The first eight days were dry and fequently very hot; on the 4th the ther. rose to 84°·8, the highest temp. recorded in September during the last 50 years excepting September, 1868. On the 9th rain set in and continued every day till 18th; the remainder of the month was dry and warm, the mornings being foggy at the end. The bar. was generally high and steady, and the wind moderate, except on the 16th. TS on 14th, T on 18th. Grain-crops secured in good condition.

BOSTON.—Rainfall from 11th to 15th, the heaviest ever known in this district, 4·28 in. having fallen in 4 days; the result being one of the heaviest floods that has been known for many years, and, coming before the harvest was completed, not only soaked into the stacks already made, but in many cases rose so high on the land as to float the sheaves of corn.

KILLINGHOLME.—Fine summer weather at the commencement and close of the month, but from the 10th to the 19th great rains. L and T on 14th, 18th, and 19th.

YORK.—The opening days of the month were remarkably hot, the max. temp. ranging from 74° to 89°; the end was fine, but the middle 10 days very wet. TSS on 4th, 16th, and 18th; sheet L on 15th and 19th; frost on ground on 17th; fogs on 27th, 28th, and 29th.

WALES.

HAVERFORDWEST.—The great heat of August and the fine character of the season continued up to the 6th; a period of broken wet weather set in on the 8th and continued till the 25th. From the 13th to the 16th was a very stormy period, the wind reaching the force of a full gale on the night of the 14th. The last week of the month was splendidly fine and genial. Harvest well saved; magnificent green crops.

LLANDUDNO.—Month rather showery, though the aggregate fall was rather below the average. The weather on the whole was genial, the mean temp. being 1°·5 above the average. Potatoes much diseased.

SCOTLAND.

HAWICK.—The month was, on the whole, one of the mildest Septembers ever known here. Cereals have been got into the stack-yard in grand order.

BRAEMAR.—A fine harvest month. The crops all of best quality, and well secured.

ABERDEEN.—Heavy R occurred from the 10th to the 15th inclusive, but the beginning and end of the month were fine. Prevailing winds S. to S.W. Rainfall somewhat above the average.

CULLODEN.—The weather during the month was particularly fine. The temp. was high on many days, the max. on the 4th (77°·1) being the highest recorded during the year. Finer harvest weather has not occurred in this month since 1846.

SANDWICK.—The weather was generally fine till the last two days. Mean temp. 2°·6 above the average of 53 years. The reaping of a luxuriant crop was finished by the end of the month, *i.e.*, about the same date as it was begun last year.

IRELAND.

KILLALOE.—A very fine harvest month with sufficient R, but not too much. Some very sultry days, and temp. high and equable throughout.

MONKSTOWN.—The early part of the month was extremely fine and hot; cooler weather with considerable R prevailed in the middle, and the end was also very fine but not so hot.

WARINGSTOWN.—Very fine and warm; considerable rainfall in the middle of the month, but on the whole very favourable.

LONDONDERRY.—Weather generally mild during the month; root crops well forward; harvest mostly secured.

HAILSTORM AT ROCHEFORT & SAINT-JEAN D'ANGELY.

"A correspondent of *La Nature* says that during the storm on August 20th, two hailstones, weighing as much as 500 (1 lb. 1½ oz.) and 490 grammes (1 lb. 1 oz.) respectively, were picked up. Another found stones weighing 220 grammes (7½ oz.) several minutes after their fall. A proprietor near Echilais had nine geese and twenty-eight fowls killed; hare, and game of all sorts were found dead; a very young foal was killed; two children were severely injured; an officer lost consciousness through the shock of a hailstone which struck him in the eye. The conformation of most of the hailstones was peculiar. The nucleus (they nearly all had one) was generally opaque, and formed of small compact masses, giving it the aspect of a raspberry. The rest of the mass was transparent, and opaque bands, following a pretty long spiral, appeared to form by a very powerful gyratory movement, opaque radial lines. [?] The crust consisted of small agglomerated pieces of ice, without determinate crystalline form. In some hailstones the nucleus was placed eccentrically."—*English Mechanic*, Oct. 1, 1880.